

## [DOCUMENT]      ABSTRACT

An optical encoder includes: a light source; a first grating, which is composed of an amplitude grating having a first grating period  $P_1$ , for spatial amplitude modulation of light from the light source; a second grating, which is composed of a phase grating having a second grating period  $P_2$ , for spatial phase modulation of light from the first grating; a third grating, which is composed of an amplitude grating having a third grating period  $P_3$ , for spatial amplitude modulation of light from the second grating; and a light receiving element for receiving light of the third grating, wherein the encoder detects a relative displacement between the respective gratings, thereby enhancing OTF from the light source to the light receiving element, and greatly improving efficiency of utilizing light.